Dr. Blaxall's Report upon the long continued prevalence of Diphtheria in the Urban Sanitary District of Taunton, and on the sanitary condition of the Town.

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September 6th, 1883.

Preliminary.

The Registrar-General's death returns for the three first quarters of 1882 showing notable mortality from diphtheria at Taunton, and the Medical Officer of Health, in reply to a communication from the Board, reporting persistent prevalence of the disease, I was instructed to visit Taunton and make inquiry into the particulars connected therewith.

The several medical practitioners in Taunton gave me lists of the cases that had come under their treatment, and I am especially indebted to Mr. W. Liddon for his observations respecting the sanitary condition of the dwellings of upwards of one hundred patients who had consulted him, and the manner in which the disease in some of these cases was contracted.

General Sanitary circumstances.

Topography and geology.

Taunton is a parliamentary and municipal borough, situated in the valley of the River Tone, which flows through the town, dividing it unequally; the greater portion being on the south side of the river. In the neighbourhood of the Tone the town lies flat, standing on the alluvial deposit, but it rises towards the south, where it rests upon the new red sandstone formation.

Building.

Many streets have sprung up within recent years, especially in North Town, and building operations are going on actively.

Industries.

Taunton forms the centre of an important agricultural district; it possesses good corn and cattle markets, which are largely attended. Besides the usual town industries, some collar and silk factories give employment to a number of females.

Population.

The population is increasing. In 1871 it was enumerated at 15,466, and in 1881 at 16,611 persons.

Sanitary Authority.

The Public Health Act was administered by a local board till 1877, when the town was formed into a corporate borough, and the Town Council became the Urban Sanitary Authority. The Urban and Rural Sanitary Authorities have appointed Dr. Alford Medical Officer of Health for each of their districts. Mr. Strawbridge holds the appointment of Inspector of Nuisances for the Urban District. Both these officers are in part paid by moneys voted by Parliament.

Water supply.

The water supply is derived partly from springs that issue on the Blagdon Hills and partly from local wells.

The water of the springs is collected in a reservoir capable of holding about 850,000 gallons, situated at Fullwood near the source. The waterworks were in the hands of a company till 1877, when they were purchased by the Authority. At that time the distribution was limited to about 1,330 houses, but the Authority have since obtained an increased supply by tunnelling and shafting in various directions, so that now some 2,800 or 3,000 houses are supplied with this water; the distribution being effected by galvanized iron pipes. The supply, however, is still very insufficient for the requirements of the town, obliging the delivery to be on the intermittent system, while from 800 to 1,000 houses are still dependent on wells.

The water being shut off daily for several hours together occasions much inconvenience, especially to poor families who have no means of storage, and are therefore obliged at such times to have recourse to wells. I received numerous complaints of the water being delivered thick and discoloured. Filtering beds, I understand, are in process of construction, these will probably improve the character of the water, unless, indeed, the discoloration complained of be due to the corroded state of the pipes. Works also continue to be carried on to secure a further increase of the supply.

As to the wells, these vary in depth, being from 20 to 30 feet deep in the red sandstone and from 10 to 15 feet in the alluvium. Their gathering ground is polluted by soakage from refuse and manure heaps, imperfect drains, &c., while certain of the

R 7851. 150.—9/83. Wt. 5492. E. & S.

wells are exposed to further risk through sink drains being led direct from the pumps to the pans of closets for flushing purposes. The dangerous relation existing between the wells and sewers was notably exemplified at a place called the Coal Orchard. Here, on the sewer being laid to a depth of 18 feet, the wells in the locality were drained of their water, and subsequently on the contents of the sewer becoming blocked the sewage found its way into the wells. This circumstance led to the wells being closed, and the town water substituted, a measure which, it is desirable, should be extended to all the houses so soon as the Authority shall find themselves in a position to supply the water.

Sewerage.

The sewers vary in construction and gradient. Some are formed of brick and are pervious, others are of glazed pipe. In the higher parts of the town on Haine's Hill the gradient is 1 in 60, whereas in North Town it is 1 in 240. Recently, on this latter sewer being opened, it was found to be half filled with black offensive mud. The Middle Street sewer is laid at a dead level, causing serious stagnation of the contents, thereby intensifying the pollution of the air in the sewer. The sewers are unprovided with means for flushing, and I am informed that the water of certain streams which formerly passed into them has been diverted, thus depriving them of the washing down they might otherwise receive.

In 1877 the Authority expended a considerable sum of money in laying down main sewers for the conveyance of the sewage to a tank near the river, about one mile to the eastward of the town. The sewage is there treated with lime, carbolic acid, and "broad salt" to promote precipitation of the solids, while the effluent sewage passes into the river. The storm water is carried off by the sewers, and during periods of rainfall the volume of water brought down is so great that it cannot be dealt with in the usual way, but is at once discharged into the river.

The sewers are some 13 miles in extent, and are unventilated. Shafts were introduced into the new sewers at the time of construction, but these, I found, had been studiously closed. The want of proper ventilation of the sewers has on repeated occasions formed the subject of correspondence between the Local Government Board and the Authority. The Medical Officer of Health has likewise from time to time directed the attention of the Authority to the necessity of making due provision for such ventilation, enforcing his advice by detailed information as to the benefits that have attended similar measures in respect of other towns.

A committee was formed to consider the subject, and they reported that in their opinion it was absolutely necessary that the sewers should be ventilated. However, up to the present nothing further has been done in the matter, the views of the committee not being shared by the majority of the Town Council.

House drainage.

The house drainage is in a most unsatisfactory condition, dangerous communication being established between the interior of the dwellings and the unventilated sewers by means of the sink and waste water pipes, which are led direct into the drains, sometimes with no intervening trap, and where traps do exist they are weak, offering but little obstruction to the escape of sewer air, especially at times when the pressure upon the air in the sewer is increased by rainfall.

Excrement removal and disposal.

Formerly cesspit privies were greatly in vogue, but these have gradually given place to closets which discharge into the sewers. Certain of the closets are provided with service cisterns, others are flushed by drains from the pumps, while in a large number of cases the washing down of the pans is made dependent upon hand-flushing, which is greatly neglected. Some of the closets are unprovided with pans, having instead square shafts opening direct into the drains; these are gradually being abolished. Examples of revoltingly filthy and offensive closets not infrequently came under notice.

With regard to the indoor closets, the soil pipes, as a rule, are unventilated; the gravity of the evil being aggravated where, as was sometimes found to be the case, the closets occupy central positions in dwellings, occasionally in the midst of bedrooms, and have no opening to the external air.

Refuse removal.

Refuse removal is effected partly by contract and partly by men employed by the Authority, a perceptible difference being observed in the two systems. Thus the localities handed over to contractors exhibited unmistakable signs of neglect in the large accumulations of refuse frequently met with, amounting in some instances to several cartloads. One such heap in Wilmot Court measured $8 \times 4 \times 4$ feet, equal to 128 cubic feet of refuse; another belonging to Holway Cottages $6 \times 5 \times 4$ feet or 120 cubic feet. Further, the residents in Eastbourne Road complained to me that the dustmen had not been there for months, whereas the localities cleared by the Authority betokened more systematic care and attention.

The Urban and Rural authorities have provided an excellent "sanitary hospital," situated just outside the borough. The buildings consist of four ward blocks with 24 beds, an administrative block, disinfecting chamber, wash-house, laundry, mortuary, and ambulance shed. The charge of the hospital, both administrative and professional, is confided to the Medical Officer of Health, who receives an extra honorarium for these duties. Infectious hospital. Provision.

Epidemic of Diphtheria.

During the recent epidemic, the first case of which I have any record occurred in October 1881, and from that time fresh cases appeared in each month up to December 1882, invading in all 127 houses, with 215 cases and 53 deaths.

It may be premised that the presence of diphtheria in Taunton is no new experience. The subjoined table of mortality statistics, abstracted from the returns of the Medical Officer of Health, showing the disease to have been fatally present in the town in each of the years 1870, 1872, 1876, 1877, and 1881, prevailing in an epidemic form in 1870, when it caused 15 deaths.

TABLE 1.—MORTALITY STATISTICS for the THIRTEEN YEARS, 1870–1882.

Year.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Whooping-cough.	Fever.	Diarrhœa.	Total Deaths from the given Zymotic Diseases.	Total Mortality.
1870	—	1	4	15	1	18	23	62	400
1871	—	4	18	—	6	9	10	47	334
1872	20	5	17	1	3	11	9	46	354
1873	—	—	3	—	8	1	6	18	270
1874	—	9	2	—	5	9	9	34	309
1875	—	—	—	—	—	6	14	20	321
1876	—	—	35	1	—	8	11	55	335
1877	—	5	7	2	19	7	11	51	348
1878	—	25	—	—	3	5	16	49	350
1879	—	1	1	—	18	4	8	32	387
1880	—	1	2	—	7	2	14	26	311
1881	—	32	1	4	7	1	6	51	347
1882	—	2	3	39	8	2	8	62	396
Total	20	85	93	62	85	83	145	553	4,462

In like manner, as regards the surrounding villages, the Medical Officer of Health reports diphtheria as present in 1877 at Cheddon and West Monkton, two villages situated about two or three miles to the north-east of Taunton. In 1878 he reports three deaths from diphtheria at Halse, about seven miles to the north-west of Taunton, stating that the disease prevailed in that village for some time, and was spread by infection. In 1879 one death, adding a few cases of diphtheria, came under notice, but he does not say where they occurred. In 1880 six deaths, but there is no observation respecting them. In 1881 (September, October, and November) he reports diphtheria as epidemic at Corfe, a village about three miles to the south of Taunton, resulting in four deaths, and he refers the spread of the disease to the agency of the schools. At the same time two or three cases of diphtheria appeared at Trull, a village midway between Taunton and Corfe. This brings us to the time of the epidemic at Taunton, which dates, as already stated, from October 1881. In this month two cases occurred in the town, the disease continuing to prevail from that time to December 1882, invading in all 127 families, with a total of 215 cases and 53 deaths, including, that is, 10 deaths in 1882 in excess of the number given in the above Table, but, as will be presently shown, they were due to this epidemic, although not given in the returns of the Medical Officer of Health. Some of the 215 cases were returned by the medical men as "diphtheritic sore throat," intending thereby to distinguish them from cases of a more severe and typical character.

There was concurrent testimony amongst all classes as to the general and continued prevalence of sore throat throughout the town; while the surgeons of the general hospital told me that amongst their out-patients many who came for advice presented such a suspicious appearance of impending diphtheria that they forbad their attendance there, urging them to go home and send for medical advice. It was no uncommon thing to hear from infected families that prior to their own attack their friends or neighbours had suffered from sore throat, and upon my making inquiry of these latter persons it appeared that their illness had been of so mild a character that no medical

man was consulted. At the same time from the particulars they gave me I was satisfied in my own mind that in some instances the nature of the illness from which they had suffered was diphtheria.

To quote for example the two following cases: Two children living in Yard Place were attacked with sore throat while attending St. James' School. The mother told me she observed white patches on their throats, and that afterwards their voices were much affected and their eyesight very bad, insomuch that "the little girl could not see to thread her needle."

Taking these facts into consideration, the probability is that 215 by no means represent all the cases that occurred.

As to the origin of the disease:—

The two initial cases of October 1881 occurred respectively in a man and a child, occupying different social positions and living on opposite sides of the town, under totally different circumstances, and, so far as I could ascertain, no communication taking place between the two families.

The man, with his wife and three children, lived on the south side of the town; he kept a little shop, and was in the habit of going into neighbouring villages to sell paraffin. Corfe and its vicinity, where, as already stated, diphtheria was very prevalent in 1881, were included in the man's rounds, and he was constantly going there up to the date of his illness, his vocation bringing him much in contact with the people. Now, the fact of his being attacked, to the exclusion of his wife and children who remained at home, raises a probability that the disease was contracted away from Taunton, and probably at Corfe or its locality.

With regard to the other case, the child was one of a family of 10 children residing with their parents and two servants on the north side of the town. I was unable to gain any clue as to the origin of this case; like the other it was a solitary instance in the family.

Following next upon these two cases was that of a child living in a court adjoining the paraffin seller's shop, and the parents ascribed the origin of the case to communication had with the infected family.

From this time the disease continued to spread, extending to all parts of the town without exhibiting any marked incidence on any particular locality.

The subjoined tabular statement is prepared to show the number of families newly invaded in each month, together with the classes and sexes of the sufferers; the number of families in which multiple cases occurred; the total cases and total deaths.

TABLE 2.—MONTHLY SEQUENCE of CASES of DIPHTHERIA, from October 1881 to December 1882, with certain specified particulars respecting the invaded families, &c.

Year.	Month.	Number of Families invaded.	Number of First Attacks amongst						Number of Families in which Multiple Cases occurred.	Number of Cases in the several Families invaded.	Deaths.	
			Adults.		School Children.		Other Children.				15 Years and upwards.	Under 15 Years.
			Males.	Females.	Males.	Females.	Males.	Females.				
1881	October - -	2	1	—	—	—	—	1	—	2	—	—
„	November - -	3	—	—	—	2	1	—	1	14	—	3
„	December - -	3	—	—	1	2	—	—	2	8	—	1
1882	January - -	4	2	1	—	—	1	—	1	5	—	4
„	February - -	6	1	—	1	3	1	—	1	7	—	1
„	March - - -	10	2	1	1	2	1	3	5	15	—	6
„	April - - -	8	—	1	—	3	1	3	2	14	—	6
„	May - - -	8	—	—	2	3	1	2	5	17	—	6
„	June - - -	9	1	1	2	4	1	—	4	15	—	3
„	July - - -	14	1	2	2	4	1	4	3	19	—	6
„	August - - -	13	1	5	—	3	3	1	3	25	—	3
„	September - -	19	2	9	2	4	1	1	9	33	—	2
„	October - -	13	1	6	2	3	1	—	2	16	—	4
„	November - -	12	—	4	1	4	—	3	8	22	—	7
„	December - -	3	—	2	—	—	—	1	—	3	—	1
	Total - -	127	12	32	14	37	13	19	46	215	—	53

It will be seen by reference to the above :—

(1.) That the newly invaded families increased from 2 in October 1881 to 10 in March 1882. That in the three following months of April, May, and June they stood at 8, 8, and 9 respectively, but rose to 14 in July, reaching the maximum of 19 in September, then decreasing to 13 and 12 in October and November, and to 3 in December.

(2.) Of the 127 primary attacks, 44, or more than one third, occurred in adults, while of the remainder, 51 were children attending one or other of the schools, and 32 children non-school goers.

(3.) Females were the chief sufferers, to the extent of more than two thirds of the total cases amongst adults and school children.

(4.) Multiple cases occurred in 46 families, varying from 2 to 6 cases in a family.

(5.) The mortality has been high, about one in every four attacks proving fatal, and the deaths, it should be noted, were confined to children under 15 years of age.

The deaths did not all take place at Taunton, one occurring at Torquay, two at Plymouth, one at Dulverton, and four at the sanitary hospital outside the limits of the borough. But inasmuch as in these cases the disease was contracted at Taunton, the deaths are included in the above table.

I heard of one instance in which a girl of about 15 had recovered from the acute symptoms of diphtheria, and was sent to Torquay for change of air. Subsequently general paralysis supervened, and in a few days she died. Other interesting particulars came to light in connexion with this epidemic, such as examples of family predisposition to contract the disease, with attendant fatal results ; and in these cases the sufferers had been more or less subject to sore throat, and some of them had had diphtheria before.

Further, four deaths here shown as due to diphtheria call for special comment.

(*a.*) Three children in one family died within three weeks of each other. The first death, that of an infant 10 months old, was registered as due to bronchitis and convulsions, the second to inflammation of vagina and gangrene, the third to diphtheria. In this last case the boy had complained of sore throat before the other two children were taken ill. In the second case the vulva was covered with a white membrane, accompanied by great œdema, and followed by gangrene. No doubt this was a case of diphtheria manifesting local symptoms in a less usual part of the body. Under the circumstances I have regarded all three deaths as due to diphtheria, and included them accordingly in the above table.

(*b.*) In another family two children, the one an infant and the other a little girl, aged six years, died within 11 days of each other. The infant's death is registered as due to bronchitis, and the second case to ulcerated throat ; but the medical man who attended these children included them in the cases of diphtheria he gave me, and from the history and particulars of the cases I learned from the mother I have no doubt they were so. (These cases will hereinafter be referred to as illustrative of disease spread by personal intercommunication.)

I visited the 127 infected houses, as well as numerous other houses in which measles, scarlatina, or typhoid fever had been present, and others again that had escaped such invasions. Diphtheria was still present in the town, and typical cases came under my own observation, as well as numerous instances of diphtheritic paralysis amongst convalescents, affecting vision, voice, and motor power.

As regards the manner of spread :—

Inquiry into the various channels by which disease is not infrequently disseminated went to show :—

(1.) As to the water supply :—Of the 127 infected families, 91 obtained their drinking water from the town supply, 30 from wells, and 6 from both sources. Now, seeing that some 2,700 families get the town water, the proportion of those attacked (90) is inconsiderable, being little over 3 per cent. So, again, as regards the wells, about 1,000 families are dependent upon this source, and 30 or 3 per cent. only suffered. Thus the disease was pretty equally distributed amongst the consumers of water of both sources. Moreover, where several families obtained their drinking water from one and the same well, it not infrequently happened that one individual only of the number was attacked. Hence there appears no reason for suspecting the water supply of either source to have been directly implicated in the spread of the disease.

(2.) As to milk :—This was obtained from different dairies, whilst a few of the infected families did not take milk.

(3.) As to sewer air :—Many of the infected houses were undoubtedly exposed to the escape of sewer air into them, but this was equally as much the case with houses exempt from disease, while a notable number of the infected

houses were not exposed to this danger, either the drain-inlets and closets being well removed from the dwellings, or the houses, as was the case in a few instances, not being included in the drainage system at all.

Further, the attacks did not exhibit the simultaneous character indicative of common exposure to such an infection.

The only instance that *primâ facie* suggested sewer air as the probable agent was met with at the Convent. Here was a school of 56 girls, holding, it is said, little or no communication with the external world. The sleeping accommodation consisted of three dormitories, 18 girls sleeping in one, and 19 in each of the two others. In dormitories 1 and 3 the wash-basins had discharge pipes leading direct into the drain, thereby affording a channel for the escape of the sewer air into the room; this faulty connexion did not exist in No. 2 dormitory, but it opened into No. 1 dormitory, and so, to a certain extent, shared in the danger, while sink and bath pipes situated on the same floor were in direct communication with the drain.

Of the 56 children 12 were attacked, namely, four in each dormitory. The dates of attack could not be ascertained, but it is clear they extended over a month or six weeks, while a fortnight elapsed between the first case and those that followed.

Now had the outbreak been due to sewer air, to the evil effects of which all in the school were more or less exposed, simultaneous attacks would have been anticipated.

There was no evidence to show how the disease was introduced into the school, but, inasmuch as measles on a previous occasion made its appearance there, diphtheria may have been conveyed by some unsuspected channel, and, once introduced, spread amongst the other children.

[I should state that at the time of my visit the connexion between the wash-basins and drains had been severed, but not so as regards the pipes from baths and sinks.]

Thus water, milk, and sewer air may alike be excluded from having exercised any direct influence on the spread of the disease; in short, careful inquiry into the conditions and circumstances under which the people lived failed to reveal anything that could be accepted as offering a satisfactory solution to the question, except personal intercommunication between the infected and healthy. And here there was good ground for suspicion, abundant evidence being forthcoming at every stage of the inquiry that intercommunication of this kind obtained to a very great extent. Personal intercourse took place freely between infected and healthy families, servants going to and fro between infected and healthy houses; females and children continuing to attend factories and schools while in an infective condition, or going there from infected dwellings, and so forth.

In illustration of the foregoing, the following examples may be cited:—

(1.) Mrs. P. went to a kindergarten school, taking with her her little girl; while waiting outside the school one of the pupils ran out and kissed the child. On the following day Mr. W. Liddon was called in to see this pupil, when he found her suffering from diphtheria. Two days afterwards he was called in to see Mrs. P.'s child, and found her also suffering from diphtheria. Upon making inquiry as to where the child had been the mother mentioned the incident of the visit to the kindergarten school and the little pupil's kiss, when Mr. Liddon at once saw the connexion between the two cases; but for the circumstance that they both came under treatment of the same medical man the probability is the origin of this second case would have escaped detection.

(2.) A gardener residing in Pearce's Court was attacked on February 15th, subsequently diphtheria appeared in the adjoining house, free intercommunication existing between the two families. Here an infant was attacked and died on March 5th; a second child, a boy, continued to go to school as usual till March 8th, when he also was taken ill and died. These deaths were registered as due to bronchitis and sore throat, as already stated on page 5.

(3.) A servant residing in North Terrace, who was in the habit of being sent to another house in the same row to inquire for sufferers from diphtheria, was herself attacked, when she was sent to her own home in the country, where she conveyed the infection to her sister.

(4.) A girl in service with a family in the Avenue was sent back to the "servants' home" suffering from sore throat, when it appeared that several members of the family she had left were also suffering from sore throat of an indefinite character. Two days after the girl's return to the "home" she manifested symptoms of diphtheria, and was sent to the hospital. At an interval of another two days a second case occurred in the "home" in one of the inmates who had been in contact with the first sufferer. She was also sent to the hospital. There had been no diphtheria in the "home" prior to the girl's return there from the family in the Avenue.

(5.) A little child residing in Fore Street was attacked with diphtheria contracted, it would seem, through the circumstance of his nurse when out walking with him having joined another nurse and child, the latter of whom was convalescing from diphtheria.

(6.) One of a family of six children was attacked with diphtheria and sent to hospital; on being discharged from there he was taken to Minehead for a week or two, and then returned to his own home. His voice and vision were much affected, and there was a free and offensive discharge from his nose. Shortly afterwards a second child and a servant were attacked, and were sent to the sanitary hospital, where the child subsequently died. The mother and the rest of the family then went to Plymouth, and within a few days of arrival there four other children were successively attacked, two cases proving fatal. Thus all six children suffered; three died.

(7.) Mr. H.'s family (consisting of husband, wife, five children, and servant) was invaded on November 17th, when diphtheria appeared in one of the little girls. The case terminated fatally on the 22nd,

and on the same day a second daughter, E., was attacked at her grandmother's (in another part of the town), where, with the other children, she had been sent on the previous day. The mother, who from this time was in attendance upon E., was attacked on the 25th, when the other three children who were in the house, but had been kept apart from E., were removed to a house a few doors off in the same terrace. Here they remained healthy for nine days, when the grandmother, who had been nursing the infected members of the family, called to see how these children were getting on, kissing L. aged eight years, but not the others. Two days afterwards the little girl L. was attacked. The grandmother told me that she herself escaped, and that she had had no sore throat.

(8.) Mr. H——y lived in East Street. There was a youth who came to his house every night to sleep. The youth was not himself attacked, but he came direct from a house in which four or five cases of diphtheria were present. Mr. H——y was the only person who came in contact with this lad, and he contracted the disease ; the infection subsequently spreading to his two sons and the servant.

(9.) Mr. J.'s family (consisting of husband, wife, and eight children) was invaded in May; diphtheria attacking one of the children. Other members of the family were at the time suffering from sore throat. In November a second child was attacked. The mother and four of the other children are said to have suffered from diphtheria two years before.

(10.) In the outbreak at the Convent school already mentioned, three out of the twelve sufferers were sisters sleeping in different dormitories. One of the three was the initial case in the school, and a second terminated fatally.

The evidence here adduced points strongly to personal intercommunication between infected and healthy as primarily concerned in the spread of the disease. At the same time there can be no doubt but that the unwholesome conditions existing in the town did indirectly conduce to its spread and fatality by predisposing people to contract disease and succumb to its effects. And the protracted presence of diphtheria, extending over fifteen months, would seem to find explanation in the delay that occurred before any attempt was made to secure the due isolation of the sufferers. The Medical Officer of Health informed me that for some months the people manifested peculiar apathy as regards the disease, its presence causing them nc alarm ; while the medical men, although invited by the Authority to give information on the appearance of dangerous infectious disease, omitted, with one or two exceptions, to do so in respect of diphtheria till about the middle of the year, and by that time the disease had got good hold of the town. The Registrar's returns of mortality were sent in monthly, and no immediate report made of any death from dangerous infectious disease. In this way it happened that the Medical Officer of Health was not in a position to cope with the disease at its outset, and to secure the isolation of cases as they occurred. The first case received into the sanitary hospital was on the 6th of March, and up to the end of May only two more cases had been received, although the disease had been prevailing since the preceding October, and had invaded some 44 families with upwards of 80 cases. The largest number of cases of diphtheria received into hospital in one month was nine in October 1882, and it is not unlikely that the subsequent speedy termination of the epidemic was related to an increased activity in securing isolation of the sufferers. In all probability had similar prompt action been taken at the commencement of the outbreak, the disease would not have assumed such widespread proportions.

This view is confirmed by the success that attended measures of isolation in respect of scarlatina, which (like diphtheria) appeared in Taunton in October 1881. The Medical Officer of Health received immediate intimation of the presence of this disease both from parents and from the medical practitioners of the town, and he was successful in securing the timely isolation of the sufferers. One case being received into hospital in October, three in November, 14 in December, four in January, and eight in February, from which time the epidemic character of the disease ceased. In all it occasioned five deaths, whereas diphtheria prevailed 15 months and caused 53 deaths.

The distribution of diphtheria in the recent epidemic in Taunton has resembled that of measles and scarlatina there in 1881, the extension of which seems to have been by personal intercourse, particularly among children attending school, and it has shown no resemblance to the localized outbreaks of enteric fever that in 1882 affected Cottage Row and Brickfields, and that ceased when polluted water supplies were disused. Again, in the recurrence of its epidemics at Taunton diphtheria has (*see* Table I.) borne resemblances to measles and scarlatina, which come at intervals of a few years and then disappear almost completely, and not to enteric fever, which is more uniformly present, and which here, as elsewhere, is distributed through pollutions of a kind operating habitually to a greater or less extent.

I have not been able to connect the varying prevalence of diphtheria with time variations in rainfall or with local variations of soil dampness. The exceptional rainfall of October 1882 occurred near the end of the epidemic of that year. I record for future use the monthly rainfall of recent years.

TABLE 3.—RAINFALL in TAUNTON during the five years, 1878–1882, supplied to me by Dr. Alford.

MONTHS.	1878.	1879.	1880.	1881.	1882.
January - - - -	·98	3·45	·56	1·53	1·39
February - - - -	·90	3·28	4·29	2·53	·96
March - - - -	1·39	·63	1·56	1·45	1·21
April - - - -	3·46	2·54	1·92	1·05	3·94
May - - - -	4·17	2·89	·79	1·87	1·75
June - - - -	1·88	4·69	1·64	2·81	3·67
July - - - -	3·86	2·34	5·74	2·01	2·99
August - - - -	5·71	4·74	·39	6·24	2·10
September - - - -	2·07	1·88	3·21	2·58	3·64
October - - - -	4·50	1·41	5·69	2·38	7·28
November - - - -	4·51	·44	2·59	2·78	4·23
December - - - -	1·91	·81	4·07	3·19	2·98
Yearly totals - -	35·34	29·10	32·45	30·42	36·14

So again with regard to the fatality of the disease, I examined into the geology of the localities where deaths occurred, in order to ascertain if the characteristic dampness of the alluvium formation had tended to this result; but, so far from this being the case, I found some excess of fatality occurred in the houses standing upon the red sandstone. The excess, however, was not sufficiently marked to justify any deductions therefrom.

In concluding this section of the Report, I would refer to the good work done by the Authority within recent years, in providing a sanitary hospital, increasing the water supply, and abolishing cess-pit privies. Prior to the provision of the sanitary hospital the town suffered severely from scarlatina epidemics,—18 deaths being referred to this disease in 1871; 17 in 1872 (probably a continuation of the same epidemic); and 35 in 1876; whereas on the recent occasion five deaths only are referred to this disease. Thus the Authority and public may be congratulated on the benefits that have resulted from the hospital. It may be objected that measles in 1881 showed a very large fatality, causing 32 deaths, but I would explain that this disease presents peculiar difficulties in the way of carrying out preventive measures, owing to its long incubating period, viz., from 10 to 14 days, and the tender ages at which children are usually attacked. With regard to other measures, the marked decrease of mortality from typhoid fever in the last few years is ascribed by the Medical Officer of Health, and probably with justice, to the improvements effected in the water supply and in the means of excrement removal. But, while noting these improvements, I would impress upon the Authority that the very unsatisfactory state of the sewerage and house drainage, and the want of an efficient system of refuse removal, are matters that demand their serious and immediate attention.

F. H. BLAXALL.

RECOMMENDATIONS.

(1.) It is highly important that immediate measures should be adopted to improve the sewerage and drainage.

These measures should include—

(*a.*) The relaying of any sewers which upon examination may be found faulty either in gradient or construction.

(*b.*) Provision for efficient ventilation of sewers and drains.

(*c.*) Efficient means of flushing.

(*d.*) The leading of sink and waste water pipes outside dwellings, and cutting them off over trapped inlets of drains.

(2.) All waterclosets discharging into the sewers should be provided with flushing cisterns.

Soil pipes of closets situated within dwellings should be efficiently ventilated, and the closets should have an opening to the external air.

(3.) It is desirable that means should be organised for the systematic removal at short intervals of house and other refuse from the vicinity of dwellings.

(4.) The works in progress for increasing the water supply should be completed with as little delay as possible, and the town water substituted for the present wells. The proposed filtering beds should be provided and the water delivered on the continuous system. Water mains that are found to be corroded should be replaced by new pipes.